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Deputy Minister,
Forest Service,
Victoria, B.C.

Dear Sir:

There is submitted herewith report on the Appraisals Section of the Forest Management Division, prepared for submission to the Royal Commission on Forests and Forestry.

Yours truly,

J.A.K. Reid

J.A.K. Reid
Assistant Forester

REPORT

to

ROYAL COMMISSION ON FORESTS AND FORESTRY

British Columbia

1955.

Stumpage Appraisals

Management Division,

British Columbia Forest Service.

J.A.K. Reid
Assistant Forester

TABLE OF CONTENTS

		Page
I	FOREWORD	1
II	STUMPAGE DEFINED	3
	GENERAL STUMPAGE APPRAISAL METHODS	3
	BASIC PRINCIPLE OF APPRAISALS	4
	COMPARISON OF VARIOUS METHODS	5
	Investment Method	6
	Overturn Method	7
	Rothery (Operating Ratio) Method	9
	B. C. Forest Service Method	14
III	B.C. FOREST SERVICE STUMPAGE APPRAISAL PRACTICE 1945	16
	Methods in Use	16
	Means of Determining the Selling Price of the finished product.	16
	Means of Estimating Operating Costs	17
	Means of Calculating a Fair Allowance for Profit and Risk margin	17
	Royalty Separate from Stumpage	18
IV	B.C. FOREST SERVICE STUMPAGE APPRAISAL PRACTICE 1955	19
	BASIC GENERAL POLICY	19
	Appraisals Impersonal	19
	Each Species Appraised on its merits	19
	GENERAL APPRAISAL METHOD	20
	Controls on the Valuation Factor	24
	INFORMATION REQUIRED FOR PROPER APPRAISAL	25
	Cruise Data and Utilization Standards	25
	Silvicultural and Management Requirements	27
	Most Efficient Size and Type of Operation	28
	Appraisal Zone and Assumed Location of Manufacturing Centre	29
	DETERMINATION OF SELLING PRICES	29
	When to Appraise on the Basis of Log Selling Prices	30
	Basis for Coast Appraisal Zones	31
	Effect of Log Grades on Selling Price	32
	When to Appraise on the Basis of Dressed Lumber Prices	33
	Basis of Establishing Lumber Price zones	33

Page

DETERMINATION OF ESTIMATED OPERATING COSTS 34

DETERMINATION OF UPSET STUMPAGE RATES 35

METHOD OF CALCULATING MINIMUM STUMPAGE RATES 36

FOREST MANAGEMENT LICENCE APPRAISALS 39

Determination of Appraisal Allowance for Cost of Forest Management 40
No Allowance until Expenditures Incurred 41
Long Term Aspect of Forestry Costs 41
Decision usually on basis of Comparison with Timber Sale Operations 42
Initial Costs of Application and Advertising 42
Inventory and Working Plan Costs 43
Fire Protection Costs 43
Forestry Staff Costs 44
Costs of Special Studies Related to Forestry 45
Costs of Forestation 45
Costs of Special Silvicultural Treatment 45
Costs of Obtaining Cutting Permits 46
Depreciation of Road Construction Costs 46
Liquidation Method 48
Method Based on Minimum Economic Investment Period . . . 49
Minimum Rate of Depreciation 50
Minimum Stumpage Rates for Forest Management Licences . 50

V SLIDING SCALE STUMPAGE 51

Explanation of Basis of the Formula 52
Anomalies that have been Observed 58

VI PRESENT STUMPAGE APPRAISAL DIFFICULTIES AND FUTURE OUTLOOK 61

Anomalies Resulting from Coastal Zones 61
Problems Presented by Interior Lumber Prices 62
Coast Appraisals VS Interior Appraisals 63
General Misunderstanding of the Nature of Stumpage Appraisals 64
Future Outlook 64

(a) Effect of Cubic Foot Scaling 65
(b) Production Time Studies 65
(c) Preparation of Appraisal Manual 65

B. C. FOREST SERVICE STUMPAGE APPRAISALS

(CHAPTER I)

1 FOREWARD

The expansion of the forest industry in British Columbia during the past decade has had a pronounced effect on the importance of stumpage appraisal methods as evidenced by the following comparison of the volume of this work in 1945 and 1954.

	1945	1954
Timber Sales Cruised:		
Number	1,500	2,500
Area (thousands of acres)	350	800
Volume (millions of cubic feet)	175	720
Timber Sales Awarded:		
Number	1,900	3,000
Area (thousands of acres)	330	690
Volume (millions of cubic feet)	160	530
Value (thousands of dollars)	$3,500	$18,900
Scale from Stumpage-bearing Lands (millions of cubic feet)	130	400
Stumpage Revenue (inclusive of royalty) from Stumpage-bearing Lands (thousands of dollars)	$2,000	$14,500

This increase in the volume and stumpage value of timber sale business has, of necessity, been accompanied by an increase in the number of officers dealing with stumpage appraisals, which, in turn, has necessitated greater standardization of appraisal methods. We have also been justified in spending more time in gathering stumpage appraisal data and exercising greater care in appraising stumpage values, for the more the value of timber increases, the more costly appraisal errors become and the more essential it is to have reliable data for predicting operating costs and values of the finished products.

This brief is designed to acquaint the Commission with the current stumpage appraisal methods of the B.C. Forest Service and to compare them with those in use in 1945. This method of presentation, it is believed, will indicate what steps have been taken to solve some of the difficulties that have confronted us in the past and will reveal those weaknesses and anomalies for which no satisfactory remedies have yet been presented.

(CHAPTER II)

STUMPAGE DEFINED

The term "stumpage", as used throughout this brief, means the dollar value of the raw timber standing in the forest; the value of the usuable wood in the tree before the tree has been touched. Stumpage does not include any part of the cost of extraction.

For many years "stumpage" has been sold in terms of the product, - board feet of lumber, lineal feet of poles, cords of pulp wood, or cubic feet of sound wood, the buyer hoped to recover from the timber stand. There was an earlier day when the standing trees of the forest property were sold at a price per tree. In order to make settlement it was common practice to count the stumps to determine the total sum owing, - hence the term "stumpage".

GENERAL STUMPAGE APPRAISAL METHODS

Before considering the details of the stumpage appraisal methods employed by the B. C. Forest Service, it might be worthwhile to consider, in a general way, the purpose of stumpage appraisals and some of the more commonly accepted methods.

Appraisals of standing timber may be required for different purposes -- as a basis of taxation, for resource

or inventory studies, for comparison of different plans of management, or to determine its market value for sale or exchange. The purpose of the appraisal is a governing factor in determining the method of valuation to be used, for example, values of immature stands cannot usually be appraised by the methods used for mature merchantable stands. As appraisals are required by the Forest Service almost exclusively for the valuation of timber being sold on a pay-as-cut basis, they are generally confined to the determination of the current market value of standing timber for immediate cutting.

BASIC PRINCIPLE OF APPRAISALS

Various approaches to the elusive problem of market values of timber are in use. One of these is the method by which the stumpage price is fixed at a percentage of the selling price of the product. This approach is unsound because it omits the very important element of cost. Proponents of this approach usually admit the percentage should be varied with the distance of the logging "chance" from the manufacturing centre. This, of course, is an attempt at considering cost but considers only transportation. As more refinements are introduced the more realistic appraisal is approached whereby the three elements, selling price, operating costs, and margin for profit and risk are considered.

All stumpage appraisal methods consider these three elements but differ in the method used to calculate the allowance for profit and risk. Thus, the basic principle of stumpage appraisals may be stated in general terms as being that the stumpage value is the portion of the selling price remaining after deducting an amount sufficient to cover all anticipated costs and a reasonable margin for profit and risk. This follows from the premise that the price a prospective purchaser will pay for timber for immediate cutting is predicated by the opportunity to make a profit from the conversion of the standing timber into a marketable product.

COMPARISON OF VARIOUS METHODS

In order to make a realistic stumpage appraisal it is necessary to determine the selling price of the finished product and to estimate, on the basis of the best information available, the total operating costs that may be anticipated in converting the timber, in a reasonably efficient manner, into that finished product. The next step is to determine the minimum reasonable profit margin that would be sufficiently attractive to allow an average operator to venture capital in the operation. The following are the most common methods used in calculating the reasonable margin for profit and risk.

Investment Method

In the investment method the margin for profit and risk is calculated on the basis of the average amount of capital invested in the operation. This profit margin is calculated as an average annual sum which is divided by the estimated average annual volume of production to determine the amount per unit of production. This method is generally recognized as the soundest approach to appraising stumpage values but unfortunately sound data are not usually available to permit its widespread application. It is also somewhat restricted because of the time-consuming intricacies of the calculations of the working capital and the average profit-bearing investment. The latter, which must be calculated separately for every item of equipment and improvement, is usually calculated by the following formula:

$$A.P.B.I. = \frac{V_1 + V_w}{2} \times \frac{n}{y} \mp \frac{D}{2}$$

Where A.P.B.I. is the average profit-bearing investment

V_1 is the initial cost of the item,

and V_w is the wrecking or residual value,

n is the number of years in use,

y is the total period in use,

D is the annual depreciation.

The total average profit bearing investment is the sum of the amounts calculated for the various items or classifications of fixed investments by the formula above.

The next step is to determine the amount of working capital required for the operation. This is done by considering the average amount of capital invested in production costs throughout the year at each step in the operation and adding an extra ten per cent or so for contingencies.

The margin for profit and risk is calculated as a percentage of the total of the A.P.B.I. and the working capital, bearing in mind that the risk attached to investment items which cannot be moved to another operation is greater than that for working capital and mobile equipment which can be recovered if the business fails.

By its nature, the investment method focuses attention on the annual rate of return on the investment as distinct from the overturn and operating ratio methods in which this consideration is somewhat obscure.

Overturn Method

In the overturn method, the margin for profit and risk is calculated on the basis of a percentage of the total operating costs (excluding stumpage). Thus, the

total annual profit is dependent on the overturn period or the number of times the working capital in the form of operating costs is turned over each year. If the overturn or average period of use of each dollar of operating costs is three months, and the operating season is nine months, the working capital is used three times per year. On the other hand, if the overturn period is six months and the operating season is only six months, the working capital could only be turned over once a year.

The method has the advantage of simplicity and resembles a rule-of-thumb in that an approximate value can be quickly and easily calculated if the profit margin percentage is judiciously selected by one who realizes the weaknesses of the system. In selecting the percentage for profit and risk to apply, the overturn period and operating season are of prime importance, and it must be remembered that the percentage of operating costs must be sufficient to permit a reasonable annual return on fixed investments. Compatible results can be obtained by this method when applied to small volumes of timber to be removed by methods which require a relatively small capital investment, particularly where stumpage payments are often deferred until the product is sold.

In comparison with the investment method, the greatest weakness of this method is that no direct comparison of average profit bearing investment can be made except on the basis of the appraiser's judgment in comparing one case with another, and even then different annual production rates may create a false impression. In cases where improvements requiring additional capital investment are made to reduce current operating costs, the use of the same percentage (of operating costs) for profit and risk would reduce the actual profit margin, thus penalizing increased efficiency.

In comparison with the Rothery or operating ratio method, the chief difference is that stumpage is not treated as an operating cost in the overturn method. A further deficiency is that the arithmetic of the overturn process is such that all errors or discrepancies in estimates are absorbed in the stumpage.

Rothery (Operating Ratio) Method)

In this method, the Margin for profit and risk is calculated on the basis of a percentage of total operating costs and stumpage. This percentage is called the profit ratic and the object is to calculate the stumpage rates for each species so as to give consistent profit ratios, taking into account any real differences in risks for the various species.

The following is an example of the calculation of stumpage value by this method:

	Species		
	Fir	Cedar	Balsam
(1) Selling-price (estimated)	55.00	45.00	40.00
(2) Profit Ratio (say 13%) -	.13	.13	.13
(3) Discount Value (see below)	48.67	39.82	35.40
(4) Operating Cost (estimated)	35.00	35.00	35.00
(5) Conversion Return (line 1-Line 4)	20.00	10.00	5.00
(6) Indicated Stumpage (line 3-line 4)	13.67	4.82	0.40
(7) Profit and Risk (line 5-Line 6)	6.33	5.18	4.60
(8) Valuation Factor (line 6 ÷ line 5)	.67	.48	.08
(9) Operating Ratio (line 3 ÷ line 1)	.885	.885	.885

Explanation of Factors:

(1) Selling Price. This is determined on the basis of information supplied as will be explained later.

(2) Profit Ratio (estimated by the appraiser) is the rate of return on the total of operating costs and stumpage that is considered sufficient to allow an opportunity for a reasonable profit from the operation considering the risks involved.

(3) Discount Value. This is calculated by discounting the selling-price by the profit ratio, i.e. in this above example the selling price is divided by 1.13. It is the portion of the selling price remaining after deducting the margin for profit and risk and is therefore the amount available for stumpage and operating costs.

(4) Operating Cost is the sum (per unit of measure) of all costs (except stumpage) which may be anticipated in the conversion of the standing timber into the finished product for which the selling price is determined. A reasonable level of operating efficiency is assumed.

(5) Conversion Return is the gross margin or difference between the operating cost and the selling-price. It is the sum available for stumpage and for profit and risk.

(6) Indicated Stumpage is of course the portion of the selling-price remaining after provision has been made for all anticipated operating costs (except stumpage) and for the margin cover profit and risk. It is calculated by subtracting the operating cost (line 4) from the Discount Value (line 3).

(7) Profit and Risk. This item is the margin for an adequate anticipated return considering the risks involved. It is calculated by subtracting the Indicated Stumpage (line 6) from the Conversion Return (line 5). It is also equal to the Selling-price (line 1) less the Discount Value (line 3).

(8) Valuation Factor is the proportion of the Conversion Return (or Gross margin) that is absorbed by the indicated stumpage rate. Hence it is calculated by dividing the Indicated Stumpage (line 6) by the Conversion Return (line 5).

(9) Operating Ratio is the proportion of the selling-price that is absorbed by the total of operating cost and stumpage, i. e., by the Discount Value. Like the Profit Ratio it is a measure of the margin for profit and risk; in fact, the two are mathematically related. For any given profit ratio, the corresponding operating ratio is the reciprocal of one plus the profit ratio, i.e., 1.00 divided by 1.13 in the above example.

These may clearly illustrated as follows:

Selling-price ($45.00)		Difference ($5.18) Profit and Risk
	Discount Value ($39.82)	
Operating Cost ($35.00)		Difference ($4.82) Stumpage
Difference ($10.00)		Total ($10.00)
Conversion Return		Conversion Return

$$\text{Profit Ratio} = \frac{\$5.18}{\$39.82} = .13 \text{ or } 13\%$$

(i.e. margin for Profit & Risk is 13% of total cost including stumpage)

$$\text{Valuation Factor} = \frac{\$4.82}{\$10.00} = .48 \text{ or } 48\%$$

(i.e. stumpage absorbs 48% of the conversion return)

In comparison with the investment method this system has the same weaknesses as the overturn method. In the above example, the operating ratio is .855 which means the total costs including stumpage take 88.5 cents of each selling price dollar. Therefore, as long as the operating costs and profit ratio are unchanged, any discrepancy in estimating the selling price is reflected in the stumpage rate in the proportion of 88.5 cents for each dollar the selling price is changed. Any error in estimating the operating costs is completely absorbed in the stumpage rate.

This method differs from the overturn method chiefly by treating stumpage as an operating cost and calculating the profit margin on the stumpage as well as on the other costs. If the above exam ple were calculated by the overturn method, the allowance for profit and risk would probably be the same for all species. At 15% of the operating costs, this would amount to $5.25 for each species, which would result in a negative indicated stumpage of $0.25 for Balsam and a higher indicated stumpage of $14.75 for Fir.

B. C. FOREST SERVICE METHOD

The Forest Service method is a modification of the method described in the preceding section. Under this method both the profit ratio and the valuation factor receive consideration. In its application, the indicated stumpage is first calculated by the method used in the above example, but the final stumpage rate is increased or decreased where necessary sothat the resultant valuation factor will not be less than .40 nor exceed .60. Where the valuation factor is between these limits, the stumpage is approved on the basis of the indicated stumpage. In the foregoing example it would be observed that the valuation factor for Fir exceeds .60 while that for the Balsam is less than .40. The final rate for Fir would be set at sixty per cent of the $20.00 conversion return or

$12.00, and the Balsam rate would be set at forty per cent of the $5.00 conversion return, or $2.00. The rate for Cedar would be established at $4.80 on the basis of the profit ratio as the valuation factor is within the prescribed limits.

This method is therefore a compromise between the operating ratio method and the "rule of thumb" basis of dividing the conversion return equally between the buyer and seller. It recognizes the general principle of the operating ratio method within normal limits but experience has proved that temporary peaks and depressions in market conditions can be disastrous to the buyer or extremely unfair to the seller if the operating ratio method is strictly followed at all times. The selling price of the product is not static but is constantly changing with the forces of supply and demand. Under the operating ratio method, from 85 to 90 per cent (depending on the profit ratio) of the changes in selling price is absorbed in the stumpage rate, but under the Forest Service method the stumpage absorbs only 40 to 60 per cent of the difference. This modifies the effect of extreme fluctuations in selling price on the appraised stumpage rate.

(CHAPTER III)

III B.C. FOREST SERVICE STUMPAGE APPRAISAL PRACTICE 1945

Methods in Use:

Prior to 1948, the Forest Service used the Investment Method for appraising larger sales -- chiefly on the Coast -- while smaller sales were appraised by the Overturn Method. As a result of its comparative simplicity, the Overturn Method was used in a high proportion -- possibly ninety per cent or more -- of the appraisals made.

Coast appraisals were based on open market log selling prices while those in the Interior were calculated on the basis of prevailing lumber prices. Although some refinements have been introduced the respective log market and lumber prices are still used.

Means of Determining the Selling Price of the Finished Product:

Coast log selling price information was provided by the B.C. Logger's Association on the basis of information voluntarily supplied to the Association by its members. The average prices for the reported log sales were calculated by grades and species and distributed to the members and to the Vancouver District Forester's office. This office distributed the information to all

Forest Service Officers who use the data. This system is still (1955) in use on the Coast.

In the Interior there was no such general and reliable basis for obtaining average selling price data on lumber prices. The matter was left to the Rangers and other field officers to estimate on the basis of information obtained directly from mill operators.

Means of Estimating Operating Costs:

The costs of extracting and processing the timber and delivering the product to the railway car or manufacturing centre were estimated by the field officers but were subject to review and approval by the appraisal officers in the District Forester's Office. These estimates were based on observations and general fund of miscellaneous information built up through discussions with logging superintendents and sawmill managers and from other sources over a period of several years.

Means of Calculating a Fair Allowance for Profit and Risk Margin:

Estimating an equitable allowance for profit and risk was purely a matter of judgment. As it was calculated as a percentage of costs, -- either in the form of unit production costs or in the form of investments --

the same amount per unit of product was allowed for each species in an appraisal regardless of any differences in risks associated with marketing the various species. This statement, however, applies only to the calculations in the appraisal, as it was common practice to modify the final upset rates set, depending on what other influencing factors might be present that were not considered in the appraisal calculations. Thus, species which were considered less desirable were often sold at lower rates than the appraisal indicated; this action, in effect, resulted in an increase in the profit margin for the undesirable species.

Royalty Separate from Stumpage:

It was the pracitce at that time to separate the stumpage and royalty payments. In addition to the stumpage rates bid on a timber sale, current royalty rates had to be paid. This fact had to be taken into consideration in the appraisal. To arrive at the final indicated stumpage rates, royalty rates were therefore deducted from the portion of the selling price that remained as a surplus after making provision for the estimated costs and margin for profit and risk.

(CHAPTER IV)

B.C. FOREST SERVICE STUMPAGE APPRAISAL PRACTICE 1955

BASIC GENERAL POLICY

The basic general policy of the British Columbia Forest Service in respect to stumpage appraisals is to evolve a method or system which will result in fixing fair and reasonable stumpage rates for Crown timber, in keeping with its actual market value in place, for all cases where this level is not fixed by freely competitive actual bidding. In attempting to improve our methods and techniques it may be necessary to alter the procedures and policies from time to time as circumstances require and as fresh information becomes available.

Appraisals Impersonal

It is the aim of the Forest Service that all appraisals be made in an absolutely impersonal manner so that insofar as possible the appraised stumpage rates for any given tract of timber at a specified time will be the same regardless of which Forest Officer makes the appraisal or who applies for the cutting rights.

Each Species Appraised on its Merits

It is the policy of the Forest Service to appraise each species on its merits without regard to other

species on the area. This practice applies throughout an appraisal, that is, logging costs, manufacturing costs, conversion factors and profit ratios may vary from one species to another in a given appraisal if the appraiser is satisfied and convinced that a difference is justified. Similarly, the appraised rate will be applied to each species regardless of the fact that the appraisal may not indicate a positive stumpage value for some other species on the area. Thus the stumpage rate for one species is not lowered to "carry" or compensate for the indicated loss which will be sustained in cutting another species.

This policy is predicated by the fact that, except in most unusual circumstances, the government does not wish to pay any operator to cut sound merchantable timber, but prefers to leave the species standing rather than subsidize its removal.

An exception to this might occur in a case where it would be in the public interest to encourage the removal of certain timber immediately to combat the spread of insects or disease, but in such cases it would be necessary to ensure that the cost (or the amount of reduction in stumpage) is justified.

GENERAL APPRAISAL METHOD

As previously explained, the stumpage appraisal method used by the B.C. Forest Service is a modification

of the Rothery or Operating Ratio method. It requires a preliminary calculating of stumpage on the basis of a profit ratio considered adequate by the appraiser. This preliminary calculation is made in the following manner.

First of all it is necessary to consider what finished products will be used for purposes of the appraisal and to determine an average selling price for these products. That is, we must decide whether the timber will be converted into logs, poles, ties, dressed lumber or some other product. In some instances, different species may be assumed to be converted into different products or one species such as cedar may be partly converted into poles and the rest into logs or dressed lumber. This step is necessary for an intelligent approach to the problem of estimating the operating costs that may be anticipated in the conversion of the timber to the specified products.

The next step is to estimate as precisely as possible the total amount of these operating costs.

Before the final calculations can be made it is necessary to convert these costs and selling prices to equivalent amounts per unit of log scale. For example, if the timber is to be scaled in cubic feet and the stumpage rate is to be expressed per C c.f. (100 cubic feet), it is necessary to estimate the total cost of converting one C c.f. of timber into the specified

product and to determine the selling price obtained for the product that can be produced from that quantity of timber. Similarly, if the timber is to be scaled in cords, lineal feet, or other measuring unit, figures must be converted to the proper unit.

The other preliminary calculations of the stumpage value are as follows:

(A)	Selling Price (estimated)	40.00
(B)	Profit Ratio (estimated)	.15
(C)	Discount Value--	
	A ÷ (1.00 + B) = 40.00 ÷ 1.15	= 34.78
(D)	Operating Costs (estimated)	30.00
(E)	Conversion Return- A - D = 40.00 - 30.00	= 10.00
(F)	Indicated Stumpage-C - D = 34.78 - 30.00	= 4.78
(G)	Profit and Risk-- E - F = 10.00 - 4.78	= 5.22
(H)	Valuation Factor-- F ÷ E = 4.78 ÷ 10.00	= .48

For explanation of above terms see pages 10 to 13

If the figures in this example were correct and applicable in a given situation they express in a summary manner most of the important considerations in the appraisal. To begin with they indicate the appraiser has reason to believe $40.00 can be obtained for the products that can be procured from one log scale unit of timber and he estimates it will cost $30.00 plus stumpage to produce and market these products.

This indicates a conversion return of $10.00 available for stumpage to the owner and for profit and risk to the operator.

The summary also shows that the appraiser considers 15% on total costs including stumpage would be a fair and reasonable allowance for profit and risk margin for the operator. On this basis the discount value is $34.78 which means that the total costs including stumpage must equal $34.78 to provide for a profit and risk allowance which will amount to 15% of $34.78. Since the selling price of $40.00 must equal 115% of the total cost including stumpage, the discount value can be calculated as the fraction 100/115 of the selling price, or simply by dividing the selling price by 1.15 in the case of a profit ratio of .15.

The other items show that these estimates indicate a stumpage value of $4.78 and a margin of $5.22 for profit and risk. This profit and risk of $5.22 is also equal to the difference between the selling price and the discount value ($40.00 - $34.78) and represents an indicated net return of $5.22 on each $34.78 of total costs or 15% of $34.78.

The valuation factor is a measure of the proportion of the conversion return that is absorbed by the indicated stumpage. In this case 48 cents of each dollar of conversion return is comprised of stumpage or it could be stated that the indicated stumpage is 48% of the conversion return.

In B.C. Forest Service appraisals both the profit ratio and the valuation factor receive independent consideration for each species. This is the modification mentioned in the opening sentence of this section and will be explained in detail in the following section.

Controls on Valuation Factor

After the indicated stumpage has been calculated in the manner described in the preceding section, the final stumpage is normally increased or decreased where necessary so that the resultant valuation factor will not be less than .40 nor exceed .60; where the valuation factor is between these limits, the stumpage is normally approved on the basis of the indicated stumpage rounded to the nearest 10¢ per C c.f. or per cord.

An example is as follows:

Species	F. & L.	S.	C.	Pw.
Selling-price per M B.M.	63.00	64.00	58.00	105.00
Conversion Factor	1.50	1.50	1.50	1.65
Selling-price per C c.f.	42.00	42.67	38.67	63.64
Profit ratio	.15	.15	.15	.20
Discount value	36.52	37.10	33.63	53.03
Operating costs	30.94	30.94	30.94	30.69
Conversion return	11.06	11.73	7.73	32.95
Indicated stumpage	5.58	6.16	2.69	22.34
Profit and risk	5.48	5.57	5.04	10.61
Valuation factor	.51	.52	.35	.68
			.40	.60
Recommended stumpage	5.60	6.20	3.10	19.80

In the foregoing example it is observed that the indicated valuation factor for white pine exceeds .60 and that for cedar is less than .40 while those for

fir and spruce fall within the prescribed limits. The final rates recommended for white pine and cedar would accordingly be determined at $19.80 and $3.10 by the application of the limiting valuation factors of .60 and .40 respectively.

INFORMATION REQUIRED FOR PROPER APPRAISAL

Before a sound appraisal of a particular tract of timber can be made, it is necessary to have a fairly comprehensive knowledge or description of the area together with some basic data with respect to the size, quantity, quality and location of the timber. In short, it is necessary to know exactly what timber is being disposed of, the conditions under which it is to be cut, and the type of operation and equipment best suited for its removal and manufacture. The more detailed and reliable the information provided, the better the opertunity the appraisal officer will have to make a rational appraisal.

Cruise Data and Utilization Standards

The following cruise information is essential in order that a proper appraisal can be made:

(a) Total volumes to be cut, by species and products. This will affect the calculation of depreciation rate for roads, camps and similar permanent improvements.

(b) Average d.b.h. by species for timber to be cut. The size of the timber has a significant effect on costs of cutting and handling.

(c) Utilization standards required. This will affect the volume to be cut and the average size of the timber. For example if trees are to be cut to a 4" top diameter, the stumpage rate should be lower than if they are cut to an 8" top diameter but the total stumpage value could be higher as a result of the increase in total volume utilized.

(d) Estimated log grades (Coast appraisals only). This will affect the average selling price used.

(e) Estimated percentage of defective timber. This will affect the estimated costs, depending on the nature and extent of defect. In some cases additional felling and bucking costs will be involved in bucking out the defect, in others where partially defective logs are handled in succeeding steps in the operation, the transportation and manufacturing costs will be increased as a result.

(f) Classification of area by acres of merchantable timber and other types of cover, with sketch of area showing relative size and shape of patches of timber to be cut and main topographic features. This will permit a reasonably good estimate of roads and improvements required for the most suitable type of operation.

(g) Any other factors which will materially affect the operating costs for the particular stand.

In addition to the above, it is often desirable to have stand tables prepared for the various types as an aid in describing the distribution of d.b.h. classes and species as well as the average d.b.h. This is particularly true where a form of selection cutting is to be practised.

Silvicultural and Management Requirements

Silvicultural and other forest management requirements may have a definite effect on the information outlined in the prededing section. For example, where individual trees are to be marked for cutting, the silvicultural method by which the trees are selected will affect the total volume and average d.b.h. of the timber to be cut, or in clear cutting the reservation of strips or patches, for purposes of firebreaks or seed sources, may affect the planning of the entire operation as well as the timber volumes to be cut. These in turn will affect the operating costs.

Restricted annual cuts as may be necessitated by management working plans and sustained yield cutting budgets may also affect the type of operation and operating costs.

It might, for example, be considered that a particular logging unit could be operated most

efficiently at a rate of ten million board feet per year. Normally, this would form the basis for the appraisal but, if other management considerations necessitated a provision in the contract to restrict the average annual cut to five million board feet, the appraisal would then have to be based on the restricted cut. This will result in increased road maintenance costs, but a lower investment in camps and a higher profit ratio due to the lower annual production in relation to the total capital investment. All these and similar factors are considered before the appriasal is finally approved.

Most Efficient Size and Type of Operation

Having considered the silvicultural and other forest management requirements for the particular stand, it is necessary for the appraisal officer to decide what size and type of operation would, in his judgment, be most efficient and logically suitable for the area. This must include provision for a method of transporting the forest products and all the steps necessary in the operation from stump to the nearest marketing or manufacturing centre. This proposed opefating method forms the basis for estimating the operating costs in the appraisal.

Appraisal Zone and Assumed Location of Manufacturing Centre

For stumpage appraisal purposes, the Province is divided into a rumber of zones based on average practice in the region. The zone and location of the nearest manufacturing centre for each product governs, to some extent, the operating costs in the appraisal, particularly with respect to allowances for transportation costs of the forest products.

As a gneral rule, where the appraisal is based on the selling price of dressed lumber, costs are allowed for processing the timber through the nearest or most convenient mill and loading it on the railroad car at the nearest or most convenient shipping point. In the case of portable rough lumber mills, where no planing mill exists within a reasonable distance, but the volume of timber cut annually in the vicinity is sufficient to warrant the establishment of one, it is assumed for appraisal purposes that a planing mill is established at the most convenient railroad shipping point.

DETERMINATION OF SELLING PRICES

The average selling price of the product is essentially the starting point of an appraisal. Without some reliable indication of the price that can be obtained for the finished product, all the other calculations would be useless.

It is the policy of the Forest Service to use for appraisal selling price purposes the average price received during the preceding three months' period for the first saleable products produced for which a freely competitive market exists.

On the Coast by reason of the open log market this product is logs, and the average selling price of logs is distributed by the Vancouver District Forester's office on the basis of information obtained from the B. C. Logger's Association.

In the Interior the product is found to be dressed lumber, and the selling price is determined by the Victoria Management Office on the basis of information voluntarily supplied to Forest Service travelling auditors by planing mills and other dressed lumber shippers.

When to Appraise on the Basis of Log Selling Prices

The decision whether to appraise on the basis of logs or dressed lumber is governed largely by the location of the area and the average normal practice in the region. In general, it is the practice in coastal regions to separate the logging from the manufacturing. Hundreds of operators restrict their operations to logging and sell the logs at going market prices. These log market prices are subject to the direct effects of supply anddemand in addition to the indirect effects of

market values for chips, pulp products, lumber, plywood, shingles or other products. Since logs are usually sorted and used for the products for which they are best suited, no single manufactured product would be an accurate indication of the value of the logs. In addition to the impracticability of appraising on the basis of manufactured products, such a practice would be unfair to the logging operators, the majority of which have no manufacturing plants. For these reasons it is the practice in coastal regions to appraise on the basis of Coast log market prices.

In the transition areas between the Coast and Interior no hard and fast line can be drawn between the areas appraised on a log basis and those appraised on a lumber basis. Average practice in this transition area varies with market conditions. Appraisals must keep pace with current practice, and at times it is necessary to make composite appraisals in some areas with low grade logs manufactured locally into lumber and highgrade logs transported to the nearest Coast manufacturing centre for sale.

Basis for Coast Appraisal Zones

For appraisal purposes the coastal region has been divided into a numer of zones based on the manufacturing plants established and the normal log marketing practice in the zone.

Estimated operating costs in the appraisal include the cost of transporting the logs to the market points as specified for the zone in which the timber is situated, and the log market prices distributed by the Vancouver District office are used as the selling prices at the market point.

Effect of Log Grades on Selling Price

Log selling prices vary considerably with their grade and the product for which they are suitable. It is therefore essential to reflect the timber quality in the appraised stumpage rate. To this end, the cruiser must provide his estimate of the log grade percentages which it is reasonable to expect could be obtained from the timber. This estimate is usually based on experience and comparison with other areas from which the production by grades is known.

Although it is not general practice to try to estimate the log grades by product as well as grade, (e.g. Subdivision of No. 1 Fir into peeler, standard, etc.) such information is desirable, and it is reasonable to calculate the selling price on this basis when the information is available. Also it is the pracitce to use the average price for standard Fir logs in regions where it is known that the timber is not suitable for the production of any peeler logs.

When to Appraise on the Basis of Dressed Lumber Prices

It is the practice of the Forest Service to appraise on the basis of dressed lumber prices throughout the Prince George, Kamloops and Nelson Forest Districts, and in those portions of the Vancouver and Prince Rupert Forest Districts where the timber is tributary to a common carrier railroad and the logging and milling are usually carried out by the same company or operator.

Where appraisals are made on this basis, the selling price used is the latest available three months' average market value of dressed lumber as determined by the Forest Service for the applicable zone. This is the weighted average price received by the shipper, f.o.b. the railway car, after deductions for freight charges, brokerage commissions, claims (for failure to meet specifications [illegible]), and adjustments for duties and exchange on foreign currency; that is, the net price at the mill.

Basis of Establishing Lumber Price Zones

The lumber selling price zones established for appraisal purposes are based on the average manufacturing practice in the region, the general timber type and species, and the markets competitively available by virtue of the railroad connecting systems and freight rates. To function reasonably well, a zone must be large

enough to ensure that a sufficient volume of the predominant species is shipped during each three months' period to prevent undue variation in the average price as a result of abnormal proportions of high-grade or low-grade shipments.

DETERMINATION OF ESTIMATED OPERATING COSTS

In estimating the operating costs, care is taken to include all costs from stump to final destination, including supervisory costs, fringe benefits in union rates of pay, holiday pay, and similar items which are not apparent unless thorough methods are used in ascertaining costs from going operations.

Allowance is made for all costs necessary to finish the product to the same extent as that on which the selling price is calculated, and to deliver the product to the point specified. For example, for timber on the Queen Charlotte Islands, the nearest manufacturing centre is considered to be Ocean Falls for pulp log grades and species and Vancouver for other log grades and species and it is necessary to make provision for costs of delivering the logs to these points. This includes costs of towing the logs to the local rafting area, sorting, building the Davis rafts, towing to the destinations, breaking down the rafts, and final towing to the plant storage grounds.

Where the appraisal is based on net dressed lumber prices f.o.b. railway car, provision is made for cost of drying and planing, including the estimated degrade loss in volume due to warping, checking, and splitting when the lumber is drying, and the cost of delivering to and loading on the railway car. Where it is known that the selling price has been calculated on the basis of a certain percentage of kiln-dried lumber shipped from the zone, provision is made in the manufacturing costs for kiln-drying a similar percentage of the timber being appraised.

Just as essential as ensuring that provision is made for all necessary operating costs is the necessity for avoiding duplication of allowances for the same cost under different headings. Careful enquiries are made to ascertain exactly what is included in cost items and contract rates so that the appraisal officer will be certain that costs are not duplicated for items such as maintenance of equipment, workmen's compensation and depreciation.

DETERMINATION OF UPSET STUMPAGE RATES

If reliable data are used correctly and judiciously in the appraisal, the resulting indicated stumpage rates are an accurate measure of the value of the timber for immediate cutting. This does not necessarily mean that it is in the public interest to dispose of the timber at

that price. In fact, the appraisal may even indicate that the operation is uneconomic -- that, under normal conditions and with an average level of operating efficiency, the costs of converting the timber into a saleable product would exceed the average market value of the product.

As a guide for appraisal officers who are faced with decisions in such cases and for the purpose of consistently uniform practice throughout the Forest Service, a policy is maintained not to dispose of timber below certain minimum stumpage rates unless there are special reasons for doing so. The necessity for immediate salvage operations to recover values which otherwise would soon be dissipated, or the silvicultural desirability of removing an existing highly defective crop to promote new productive forest growth would be examples of cases where it might be considered in the public interest to dispose of the timber below the normal minimum stumpage rates established at the time.

Normally, where stumpage rates in excess of the prescribed minimum are indicated by the appraisal and fall within the limits of forty to sixty percent of the conversion return the upset stumpage rates are set on that basis.

METHOD OF CALCULATING MINIMUM STUMPAGE RATES

Normal minimum upset stumpage rates are currently set

at the highest rate calculated by the following three alternative methods:

(a) 40% of the conversion return

(b) 2½ times current royalty rates

(c) A percentage of the selling price (per unit of log scale) used in the appraisal, depending on the Region:

(i) Coast appraisals in the Vancouver Forest District -- 10% of the log selling price used in the appraisal.

(ii) Coast Appraisals in the Prince Rupert Forest District -- 9% of the log selling price used in the appraisal.

(iii) Appraisals on the basis of the finished lumber prices -- 7% of the dressed lumber price used in the appraisal.

The first alternative -- 40% of the conversion return -- really has little to do with minimum stumpage rates but is rather part of the current B.C. Forest Service method of calculating the indicated stumpage rate in an appraisal.

The second alternative is related to a comparison with the Crown dues (royalty) an owner of private timber would normally have to pay after holding the land and paying taxes and other carrying charges on it for a considerate number of years.

The third limiting factor -- the percentage of the

selling price -- is a result of two considerations, namely, the percentages of the selling prices that were normally bid in previous years, and the effect which might be produced by the election of sliding scale stumpage adjustments. It was as a result of the former consideration that the percentage was varied between the two coastal regions, while the different end products on which the selling prices are calculated accounts for the difference between the percentages applied in the Coast and Interior appraisals.

The sliding scale stumpage adjustment formula influences the decision in the following manner. The stumpage rate bid in comparison with the average market value (of the product) quoted in the particulars of the sale, sets the basic ratio once and for all (as far as the species in question is concerned) during the life of the contract. Thenceforth, revised stumpage rates are re-calculated at $\frac{3}{4}$ or 5/4 of that basic ratio (times the current market value) depending on whether the current market value is below or above the one quoted in the particulars of sale. Thus, if the bid price is 10% of the selling price at the time of issuance of the sale, subsequent rates (in the event adjustments become due) will be calculated at 7½% or 12½% of the current selling price depending on whether it is above or below the original. From this it follows that, if the original stumpage price

is at a very low percentage of the selling price, subsequent increases will be very small in the event of rising market prices. For example, if the bid price were equivalent to only 4% of the selling price, the maximum stumpage rate would be only 5% of the current price, with the result that at a selling price of $100 the stumpage would be only $5.00

FOREST MANAGEMENT LICENCE STUMPAGE APPRAISALS

Under the provisions of subsection (20) of Section 32 of the "Forest Act" the holder of a Management Licence may elect to pay stumpage by one of two alternative methods in respect to timber cut from Crown lands included in the Licence, and not held under other tenure.

The first of these alternative methods provides that for all timber on such areas which is considered merchantable at the time the Management Licence is signed, the licensee shall pay the full appraised stumpage rate, as and when the timber is cut, and the appraisal shall be made by the method currently in use by the Forest Service. In this event no allowance would be made in the appraisal for any extra forestry costs as a result of operating under the terms of the Management Licence. As and when other timber is cut from such areas (i.e., timber too young to be considered merchantable when the Licence is signed) the licensee shall pay sixteen per cent of the stumpage rate, inclusive of royalty, appraised by the method

currently in use by the Forest Service.

Under the second alternative method which is the most common, all timber cut from such areas must be paid for at the rate appraised by the Forest Service but the appraisal must allow as a logging cost the extra forestry costs sustained as a result of operating under the terms of the Management Licence.

Before an appraisal can be finally approved, it is necessary to ascertain which of these alternatives has been elected and to include or exclude the forestry costs accordingly.

Determination of Appraisal Allowance for Cost of Forest Management

The costs of forest management, including protection and silvicultural treatment, on a Management Licence which are deemed to be just and proper are commonly referred to as forestry costs.

The problem of segregating forestry costs from operating costs is a complex matter, and many specific items must be dealt with on their particular merits in consideration of circumstances on the Management Licence concerned. However, decisions are usually made in accordance with the general principles embodied in the following subsections.

The fact that certain items are not recognized as forestry costs does not imply that these costs will not be recognized elsewhere in the appraisal but merely that

the items to be included under the term "forestry costs" should be confined to those which would not be incurred if the company were not practising long-term forest management on a sustained yield basis.

No Allowance until Expenditures Incurred

As a general rule, no allowance will be made in an appraisal for forestry costs that have not actually been incurred by the licensee.

Difficulty has been encountered in attempting to make reasonably accurate predictions of the amount that would be spent for forestry work. In some instances foresters have outlined rather large programs, later to find that funds are not made available to them for the purpose of carrying out the work, despite the fact that allowances were made in the appraisal.

Therefore, it is the policy of the Forest Service not to make the allowance until the cost has been incurred by the licensee. Holders of Management Licences are made aware of this policy and are requested to submit, periodically, statements of the forestry costs they have incurred. It is customary to obtain this information from the company each year and make the allowance for the previous year's expenditures on the timber to be cut the following year.

Long Term Aspect of Forestry Costs

Forestry costs are generally confined to items

which have a fairly long term forestry aspect and which are not chargeable to a particular small unit of timber being cut, e.g., costs of cruising for inventory or working plan purposes would be classified as a forestry cost, but the cost of cruising timber for immediate cutting under a cutting permit would be considered an operating cost.

Decision usually on Basis of Comparison with Timber Sale Operations

Forestry costs do not usually include allowances for methods or practices in general use by companies of similar size that are still operating on a timber sale or liquidation basis, e.g., many companies, particularly on the Coast, make a practice of providing fire protection equipment in excess of requirements under Forest Service regulations and take extra fire prevention precautions to protect their logging investments and improvements and to comply with insurance requirements; these, therefore, are considered operating costs.

Initial Costs of Application and Advertising

Initial costs of application and advertising are not considered a forestry cost. Companies operating on a liquidation basis are constantly confronted with costs of locating and acquiring timber, contacting owners, statusing lands, applying for timber sales, cruising and advertising costs, etc. These may be considered a

straight cost of staying in business, the difference being that the management licencee has a higher initial cost in acquiring a perpetual supply of raw material. The acquiry of the licence is deemed sufficient compensation for this expense (in comparison with an unsuccessful applicant) without the additional benefit of a refund of all costs through lower stumpage; hence, no allowance for these expenses is made in the appraisal.

Inventory and Working Plan Costs

Inventory and working plan costs (including initial working plan) are deemed to be forestry costs and are amortized over the period between successive revised working plans unless the cost is small enough to be treated otherwise.

Fire Protection Costs

Fire Protection costs fall into three main classes and are treated accordingly.

(a) Equipment, improvements, and personnel used chiefly in protecting the standing timber from fire or in minimizing the probability of serious damage in the event a fire occurs, e.g., permanent weather stations, trails, lookouts, access protection roads not suitable for logging, lookoutmen , patrolmen, fire-tool caches, and similar items. These expenditures for fire prevention are treated as forestry costs.

(b) Equipment, improvements, and personnel engaged

chiefly in the prevention of fire on the actual operation, which, it is reasonable to suppose, would be provided by the licensee or operator whether or not the operation was being conducted on a Management Licence, e.g., all fire tools and equipment recuired by the regulations and, in some cases, additional equipment of a similar nature and purpose. These expenditures are treated as operating costs.

(c) Actual fire-fighting costs, anywhere in the Management Licence area. These expenditures are not allowed as a forestry cost or as an operating cost in the appraisal. The total operating costs used in any stumpage appraisal are the appraisal officer's estimate of the costs which will be encountered; hence, provision cannot be made for costs of fighting fire. This is a risk which the licensee or operator must assume and as such can only be allowed for in the profit ratio selected. Furthermore, the "Forest Act" sets out the circumstances under which the operator shall have a claim against the Crown for expense incurred in fighting forest fires.

Forestry Staff Cost

The decision with respect to what forestry staff cost to include in the forestry costs will depend on the nature of the work the personnel are doing. Time spent in such duties as cruising timber for immediate cutting, laying out logging roads, and other work related to the

actual logging operation will be treated as an operating cost, but time spent on inventory work, pathology, entomology, growth studies, reforestation, laying out access protection road, etc. may be considered forestry costs.

Costs of Special Studies Related to Forestry

Costs of special studies related to forestry will be deemed forestry costs if their primary object is to determine the condition and behavior of forest stands. These will include such subjects as ecology, growth and yield, pathology, entomology, mensuration, and experimentation with various silvicultural systems or practices. On the other hand, studies of production techniques in logging or manufacturing, marketing methods and similar studies designed to improve the efficiency of the operation will not normally be allowed for in the forestry costs.

Costs of Forestation

Costs of reforestation and aforestation on areas not privately owned will be treated as forestry costs.

Costs of Special Silvicultural Treatment

It is the objective of the Forest Service that cutting in every stand be conducted under what is considered the best silvicultural treatment for the particular stand, whether on a Management Licence or not. Therefore, as long as it is anticipated that a particular operation will be economically feasible and profitable under the

silvicultural treatment proposed, it should stand on its merits without charging part of the cost to forestry. In general, forestry costs do not include allowance for added logging costs attributed to the special silvicultural treatment, but these are reflected in the other estimated operating costs.

Exceptions to the above would be special studies mentioned previously and special cases where timber is intentionally removed at a loss for stand improvement purposes or to combat the spread of insects or disease. The loss sustained in such cases could be included as a forestry cost provided the loss was not due to a change in market conditions.

Cost of Obtaining Cutting Permits

Cost of obtaining cutting permits is treated as an operating cost rather than a forestry cost as it is comparable to the cost of obtaining a timber sale.

Depreciation of Road Construction Costs

The method of depreciating logging roads on Management Licences may differ from the normal practice used on timber sales. Where an operator constructs a road for a timber sale, the timber tributary to the road is usually removed during a relatively short period, and the road may be depreciated against the available tributary timber. On Management Licences it will sometimes require a much longer period to remove all the tributary timber. This

may require a complete rotation, or, in the case where a sustained yield unit is intensively managed under a selection cutting system, it is conceivable that the road might be used until a more economic transportation method is devised which would render the road obsolete.

It is the objective of the Forest Service to have the logging roads on a Management Licence written off as quickly as possible. Where the licensee undertakes an extensive program of advance road construction, this means as quickly as the appraisals will reasonably permit, and it may be necessary to vary the rate from year to year according to market conditions and other factors.

There are several possible methods of treating the costs of logging roads. The matter is usually discussed with the management licensee to determine which is most suitable for the particular licence in consideration of the accounting practice of the company. In some cases it will be preferable to combine all road costs on a Management Licence into one total and depreciate it against the total cut from the licence area. In others, it may be desirable to segregate main road costs from branch road costs and charge the latter to the particular cutting permit areas they serve. Circumstances vary somewhat from one Management Licence to another. In each case an effort is made to arrive at a mutually satisfactory method, and the licensee is asked to co-operate by keeping records and providing the required road cost information.

Liquidation Method

The method of calculating the depreciation of logging road costs whereby the cost is depreciated against the total volume of tributary timber may be referred to as the liquidation method. This is the method generally used in timber sale appraisals, in clear-cutting operations, and in cases where the road will be used as a logging road for the removal of a certain volume of timber (during an initial cutting cycle, for instance) after which another road will be developed.

There are two common systems of calculating the rate of depreciation under this method. By one method the total estimated cost of the road system in the topographic unit is divided by the total estimated volume of timber to be removed to determine the rate per unit. By the second method, the amount of money spent on road development is divided by the volume of timber tributary to the roads developed to that point, and as the roads are extended the depreciation rate is progressively recalculated by dividing the undepreciated cost by the new estimate of timber made accessible. For example:

During the first year, three miles of road might be constructed at a cost of $15,000 and this might provide access to 1,000,000 cubic feet of timber. The rate of depreciation would then be set at $1.50 per C. c.f. During that year 400,000 cubic feet might be removed with the result that $6,000.00 is written off, leaving an

undepreciated amount of $9,000.00 During the second year another three miles of road might be constructed at a cost of $12,000, providing access to an additional 1,000,000 cubic feet. The total undepreciated cost is then $21,000, and the corresponding volume of timber is 1,600,000 cubic feet. The rate of depreciation for the second year is therefore calculated at $1.31 per C. c.f.

Method Based on Minimum Economic Investment Period

A more flexible method of calculating depreciation on logging roads on Management Licences is one whereby the costs are depreciated against the volume of timber that will be removed in an arbitrarily assumed period of time. The length of the period is varied to suit the circumstances. Where no large scale program of advance road-building is involved, the period may be as short as one year, which results in treating road construction costs as a current operating expense. In other cases, a period of ten or twenty years may be required to write off the investment at a reasonable rate consistent with circumstances.

Under a modified version of this method the rate is varied from year to year depending on market conditions, other operating costs, and the undepreciated cost of logging roads in relation to the allowable annual cut. In effect, this amounts to charging a minimum depreciation rate when the conversion return is small and increasing the rate of depreciation at more favourable

periods in keeping with the Forest Service objective of depreciating the roads as rapidly as practicable.

When using this method, care must be taken that depreciation charges are not deferred to the point where the undepreciated amount is unreasonable in relation to the allowable annual cut.

The Minimum Rate of Depreciation

The minimum rate of depreciation, while any depreciation charges on logging roads are deferred under the above method, is determined on the basis of the average road construction costs incurred on timber sales in the region under reasonably similar conditions. To be consistent with our practice in timber sale appraisals, this amount must be written off whether or not a minimum stumpage rate is applied.

Minimum Stumpage Rates for Forest Management Licences

Minimum stumpage rates for timber cut from Management Licences are the minimum for Timber Sales less one-half of the forestry costs for the particular licence.

(CHAPTER V)

V SLIDING SCALE STUMPAGE

From 1912 to 1951 it was the firm policy of the Forest Service not to reduce the stumpage rates on a timber sale by means of or as a result of a re-appraisal as it was believed such a practice would lead to abuse and misunderstandings. The only means available for a reduction in stumpage rates on a Timber Sale prior to the introduction of the sliding scale option involved surrender of the existing contract with a request for an entirely competitive new sale. Such procedure included forfeiture of the security deposit and no consideration for any equity the licensee might have in respect to improvements appurtenant to the area when the new sale was disposed of by public competition.

This policy was incompatible with the requirements for long term timber sales as proposed in 1949 and 1950. Judging by the manner in which prices of logs and lumber had behaved in the past, there would certainly be some wide fluctuations in prices during the ten to twenty year periods involved in these long term timber sales. The sliding scale stumpage adjustment formula was therefore devised to permit some upward and downward adjustments in stumpage prices on these long term sales whenever important changes in market conditions occurred, and at the same time to permit the Department to maintain its long standing stumpage re-appraisal policy. It was not intended that the formula should reflect minor changes in market prices, such as might occur from one month to another, but only to permit adjustments in the event major variations of 20% or more should occur.

The new system received popular support from industry and its use was extended in October 1951 to include

short term contracts (except those for minor products) on an optional basis according to the preference of the successful bidder at time of award of the sale. At first, the option of having stumpage adjustments by sliding scale instead of by re-appraisal at two years intervals applied only to contracts awarded after that date, but in March 1953, the option was offered to licensees of contracts awarded prior to October 1951.

Many persons engaged in the forest industry felt the requirements that market prices change by 20% before an adjustment could be made in stumpage rates did not permit the adjustments to be made frequently enough. As a result of their representations this requirement was reduced to 15% in the case of sales made after September 1952.

The sliding scale method of stumpage adjustment is now the two to one favourite of timber sale licensees.

Explanation of Basis of the Formula

As explained above, the general object of the sliding scale stumpage method is to have the stumpage rates tied to a market price index and adjusted from time to time as the index rises or falls. However, the nature of a stumpage appraisal is such that, in the event of a rise in market value of the product, not only is a higher stumpage value indicated but the proportionate increase in indicated stumpage value is greater than the proportionate rise in market value. The converse

holds true when market values decline. An attempt was made to embody this concept in the formula for making stumpage adjustments by increasing or decreasing the percentage of the average market price according to whether the index is above or below the original.

The basis of determining the market price index or average market value for purposes of sliding scale stumpage adjustments is as follows:

> In the Interior, it is determined in the same manner as the selling price used in stumpage appraisals, namely, the average net price received for each species, during the preceding three months for shipments of dressed lumber from the zone and rounded to the nearest dollar.
>
> On the Coast, it is determined as the average price by species for all reported log sales during the preceding three months according to information from the B.C. Loggers' Association and rounded to the nearest dollar.

Before an adjustment in stumpage rates can be made for any species, two conditions must be satisfied:

> (a) Three months must have elapsed since the date of the contract or since the last adjustment for that species.

(b) The current price index or average market value in use must be at least 15% or 20% (as stated in the contract) above or below the one in effect when the present rate for that species was fixed.

If these two conditions have been fulfilled an adjustment becomes due and the revised stumpage rate is determined in accordance with the sliding scale formula. In expressing this formula the term "Basic Ratio" is used to define the relationship between the stumpage rate bid for a species and the original average market value as quoted in the contract. For instance, in the example below, the Basic Ratio would be the bid stumpage price of $14.40 divided by the original average market value of $60.00 and it could be expressed as .24 or 24% Adjusted stumpage rates would be calculated by whichever of the following three alternatives would be applicable to the particular case, provided the above two conditions are satisfied:

1. If the current average market value is higher than that quoted in the contract, the revised rate becomes 1.25 times the Basic Ratio percentage of the current average market value, and the stumpage rate is adjusted accordingly up or down. In the example below, 5/4 of 24% of the current average market value.

2. If the current average market value is lower than that quoted in the contract, the revised rate becomes 0.75 times the Basic Ratio percentage of the current average market value, and the stumpage rate is adjusted accordingly down or up. In the example below, 3/4 of 24% of the current average market value.
3. But if any adjustment has been made previously and the current average market value is within 10% of that quoted in the contract, the rate reverts to the original rate bid and the next adjustment will be made when the average market value has departed by the required 15% or 20% or more from that quoted in the contract. That is, we start all over again using the original rate bid and the average market value quoted in the contract.

Each species is treated individually for adjustment purposes. Thus a sale covering four species is treated as four separate contracts when it comes to calculating the adjustments for the different species. One or more species might have their stumpage rates adjusted one month and some other species could have its rate adjusted the following month. It is the practice, however, when an adjustment is made for any species to include in the notice of stumpage revision both the current average market values and the current stumpage rates for all

species. Stumpage rates for deciduous species and for minor products are not adjusted during the life of the contract.

There is a further provision that in no case shall any stumpage rate be less than two and one-half (2-1/2) times the current royalty rate for the species involved.

To illustrate the effect of sliding scale stumpage on the rates charged under various market prices the hypothetical example below is presented. For purposes of this example it is assumed only one species is involved and its average market value at the time particulars of the sale were distributed was $60.00. As a result of competitive bidding the bid stumpage rate is set at $14.40. It is also assumed that the contract was issued prior to September 1952 so that adjustments are made on the basis of a 20% change in average market value and that, over a considerable period of time, the average market value gradually dropped to $36.00 then rose to $75.00 and finally fell to $57.00.

The following will show the various adjustments that would have been made in the stumpage rates:

EXAMPLE

Average Market Value quoted in Contract	$60.00
Bid stumpage price	$14.40

First Adjustment:

Current Average Market Value	$48.00

Revised stumpage rate becomes $0.75 \left(\frac{14.40}{60.00} \times 48.00\right)$

$= .75 \times 11.52$

$= \$8.64$

This would be rounded to $8.60.

Second Adjustment:

Current Average Market Value $38.00

Revised stumpage rate becomes $0.75 \left(\frac{14.40}{60.00} \times 38.00\right)$

$= .75 \times 9.12$

$= \$6.84$

This would be rounded to $6.80

Third Adjustment:

Current Average Market Value $46.00

Revised stumpage rate becomes $0.75 \left(\frac{14.40}{60.00} \times 46.00\right)$

$= .75 \times 11.04$

$= \$8.28$

This would be rounded to $8.30.

Fourth Adjustment:

Current Average Market Value $56.00

As this is within 10% of the original average market value of $60.00 quoted in the contract, Revised rate becomes the original rate of $14.40 and next adjustment will be made when the current average market value is 20% above or below the contract base price of $60.00.

Fifth Adjustment:

Current Average Market Value $72.00

Revised rate becomes 1.25 $\left(\frac{14.40}{60.00} \times 72.00\right)$

$= 1.25 \times 17.28$

$= \$21.60$

Sixth Adjustment:

Current Average Market Value $57.00

Original bid rate of $14.40 would apply as in the case of the fourth adjustment above.

Anomalies that have been observed

The application of the 5/4 and 3/4 constants to the basic ratio in the formula results in an anomaly when, through public competition or otherwise, the stumpage rate bid exceeds a certain percentage of the average market value quoted in the particulars of the sale. In such event, the application of the formula will result in an increase in stumpage rate greater than the increase in market value of the product in the case of the first upward revision in rates above the bid rates.

The basic ratio at which this occurs can be calculated mathematically at 34% of the average market value when the contract makes provision for stumpage adjustments on the basis of a 15% change in average market value. That is, if the original stumpage rate bid exceeds 34% of the average market value (in terms of the same unit of measure) the increase in stumpage, as a

result of the first upward stumpage adjustment, will exceed the 15% increase in selling price that has taken place.

This has actually happened in only one or two isolated cases but it constitutes what could be a serious weakness in the formula in the event future stumpage rates absorb a higher percentage of the selling price.

The Forest Service is seeking a means of eliminating this anomaly by a further provision to apply to future contracts. In the meantime, we warn the buyer at the time of award of the sale, that the consequences of electing stumpage adjustments by sliding scale may be as indicated above. On the other hand an adjustment as a result of a reduction in the average market value will be substantial. His alternative is to elect stumpage revision by re-appraisal at two year intervals in which case the rates can not be reduced. However, the possibility of any increase is remote as the re-appraisal would have to justify any increase above the existing high rate bid.

A second anomaly has been observed in the results obtained by the use of the formula. Ideally, a sliding scale formula should result in approximately the same stumpage rates for all species of equal average market value on the same sale, regardless of their respective values at the time of award. That is, one might expect

that, regardless of what current selling prices for various species on a sale might be, the same stumpage rate would result for each one when its market value reached a certain point, say $70.00. This result is not obtained with the application of the present formula because various species in one contract rarely have similar basic ratios. For example, one species might carry an original rate equivalent to 10% of the average market value, while that for another species in the contract might equal 20% of its market value. Under the formula, revised rates for the first would be calculated at 7½%, 10% or 12½% of its average market value while the corresponding percentages for the other would be 15%, 20% or 25%. Under these circumstances the two species would always have different rates calculated for similar market values.

The same type of anomaly has been observed as a result of appraising the same sale at different times on the basis of revised selling price dates. Operating costs change rather slowly and gradually in comparison with the violet fluctuations in selling prices that have been experienced in the last few years. A change of $10.00 per M. b.m. in selling price, which is not uncommon over a period of six months or a year, has a very significant effect on the indicated stumpage rate and hence may substantially alter the basic ratio for sliding scale stumpage purposes. This effect will be reflected in the stumpage rates throughout the life of the contract.

In spite of these weaknesses this system of adjustments appears to have worked reasonably satisfactorily and, in general, has accomplished its objectives.

(CHAPTER VI)

VI PRESENT STUMPAGE APPRAISAL DIFFICULTIES AND FUTURE OUTLOOK

Anomalies Resulting from Coastal Zones

The eight coast appraisal zones were set up on the basis of existing manufacturing plants and usual log marketing practice. The general principle is to segregate the logs into the two main classes -- those best suited for pulp manufacture and those suitable for lumber, shingles and plywood manufacture -- and to appraise each class to the nearest logical manufacturing centre. The Forest Service does not recognize that a specified grade of pulp class logs is worth more to one pulp plant than to another, or that a specified grade of lumber class logs is worth less at one sawmill than another. Therefore, the same average selling price for the specified log classifications is used for all zones, although the practice is opposed by some representatives of the logging industry. This system results in the following anomalies:

(i) Port Alice Zone - the indicated stumpage for fir is often lower than for hemlock in spite of its higher selling price. This is due to the high cost of transporting the fir and other lumber class logs to Vancouver in comparison with the short inland water tow to Port Alice for hemlock and other pulp class logs.

(ii) Tahsis Zone - in this zone, although adjacent to the Port Alice Zone, the indicated stumpage for the lumber class logs is very high due to the short tow to the sawmill.

(iii) Alberni and Cowichan Lake Zones - indicated stumpages usually high in comparison with other Coastal regions due to short distance from the assumed manufacturing centre for all logs

Problems Presented by Interior Lumber Prices

The chief anomalies in interior appraisals concern the "minor species" for which we are unable to obtain satisfactory selling price data. In most zones lodgepole pine and balsam. are involved but hemlock also constitutes a problem in some regions. These species, even when sound, are generally less favoured by lumber operators and they can seldom be marketed on their merits. The annual cut of lodgepole pine exceeds a hundred million board feet, making it third in volume in the Interior. Yet, according to invoices of lumber shipments, practically no lodgepole pine lumber is sold. Obviously, it is mixed with and

sold as spruce, fir or some other species. The same thing happens with balsam and hemlock.

Since these species are not marketed on their own, we are unable to determine separate selling prices for them but must use the price for the major species with which they are associated. This often results in charging the same stumpage rates for these species as for the preferred major species. Where a difference is recognized it is by a purely arbitrary means.

In some regions this problem becomes more acute as a result of excessive defect in these unwanted species. Each District has experienced some examples of this, in some areas it is the balsam, in others hemlock or cedar, and in others the Lodgepole pine may be defective or very small in diameter.

Coast Appraisals VS Interior Appraisals

The third group of anomalies appears when an attempt is made to compare Coast stumpage prices with those prevailing in the Interior. Although Coast rates are usually higher than those in the Interior, there are times when log prices may become abnormally depressed in comparison with lumber prices and, as a result, Coast stumpage rates for one or several species may fall below those in the Interior. An example of this occurred in 1953, when hemlock log prices dropped to less than $30.00 per M.b.m. in comparison with present levels around $45.00 and the peak

of $60.00 reached in 1951. The outcome of this was that the average prices bid for hemlock and some other species were higher in the Interior than corresponding prices on the Coast.

An exception to the general rule is white pine whose stumpage price is normally higher in the Interior. The reason, of course, is the anomalous selling price structure. The average net price received in the interior for white pine lumber is about $110.00 while that for other species like fir and spruce is in the neighbourhood of $60.00 to $70.00. By contrast, the average log prices on the Coast for white pine are roughly the same or only two or three dollars higher than those for fir.

General Misunderstanding of the Nature of Stumpage Appraisals.

A considerable number of objections to appraised upset stumpage rates are received in times of rising market prices. Most of these result from the failure of most operators to become acquainted with the principles of stumpage appraisals. These individuals are inclined to think stumpage rates are set by some mysterious process or that general levels are set from time to time according to someone's fancy.

Future Outlook

The general outlook as far as stumpage appraisals are concerned is for a continued gradual increase in the volume

of work and in the appraised values of timber. This trend will be interrupted by recessions from time to time.

The immediate future, it is anticipated, will hold the following results:

(a) Effect of Cubic Foot Scaling. The cubic scale, being a more accurate measure than the board foot scale, will assist in appraisals by enabling more precise estimates to be made of operating costs. Many variable costs-- such as felling, skidding, and transportation costs -- will be found to be more closely related to cubic foot volume than to board foot volumes.

(b) Production Time Studies. Some time and motion studies have been commenced to ascertain what variable factors have the most important effect on the rate of production. It is anticipated that this phase of appraisal work will continue and increase in scope and that the findings will contribute toward more accurate predictions of operating costs.

(c) Preparation of Appraisal Manual. A manual of instructions to assist Forest Service Officers in appraising stumpage value of standing timber is in the course of preparation. This manual, when distributed, will assist in standardizing appraisal methods and result in more consistency in valuations obtained by various officers.